

Table 5**Public Groundwater Supply Sources Within 4-Radial Miles of
Heyman Properties/Pratt & Whitney**

Distance/ Direction from Site	Source Name	Location of Source ^a	Estimated Population Served	Source Type ^b
0.7 miles east	Charter Oak Boulevard Wells	Manchester	8,823	Three Overburden
1.4 miles southeast	Fern Street Well	Manchester	2,941	One Overburden
1.7 miles northwest	Love Lane Well	Manchester	2,941	One Overburden
2.0 miles northwest	New State Road Wells	Manchester	8,823	Three Overburden
2.3 miles southwest	Redwood Farms Wells	Manchester	407	Two Bedrock
2.3 miles northeast	Parker Street Well	Manchester	2,941	One Bedrock
2.8 miles north-northeast	Progress Drive Well	Manchester	2,941	One Bedrock
3.7 miles south-southwest	Pine Hill Well	Glastonbury	36	One Unknown

^a Indicates Town in which well is located.

^b Overburden, Bedrock, or Unknown.

[44-47]

An estimated 7,064 people are served by private groundwater sources within 4-radial miles of the property. Residents who rely on private groundwater supplies within a 4-mile radius of the property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private drinking water supply wells for "Block Groups" which lie wholly or in part within individual radial distance rings measured from potential sources on the property [36]. The Manchester Health Department maintains records of locations of private drinking water supply wells within Manchester and indicated that there are none known to be located in the immediate area of the HP/P&W property; however, the Health Department was not able to provide information on the nearest private drinking water supply well location [37]. Table 6 summarizes estimated drinking water populations served by groundwater sources within 4-radial miles of the property.

Table 6**Estimated Drinking Water Populations Served by Groundwater Sources
Within 4-Radial Miles of Heyman Properties/Pratt & Whitney**

Radial Distance from Heyman Properties/ Pratt & Whitney (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
≥ 0.00 to 0.25	1	0	1
> 0.25 to 0.50	7	0	7
> 0.50 to 1.00	51	8,823	8,874
> 1.00 to 2.00	770	14,705	15,475
> 2.00 to 3.00	2,200	6,289	8,489
> 3.00 to 4.00	4,035	36	4,071
TOTAL	7,064	29,853	36,917

[36; 44-46]

Between 20 and 25 September 1990, five soil borings were advanced by F&O south of the building on the property and completed as shallow groundwater monitoring wells (MW-1 through MW-5). MW-1 was installed at the northeast corner of the asphalt parking lot; MW-2 was installed adjacent to the southeast entrance of the parking lot; MW-3 and MW-4 were installed at the north-central and southwest edges of the former 10,000-gallon UST; and MW-5 was installed at the northwestern portion of the parking lot. All wells were advanced to a minimum of 7 ft below the water table. From 25 September 1990 until 13 November 1990, a weekly groundwater elevation monitoring program was conducted in order "to determine the necessity of additional shallow wells and the appropriate location of the deep overburden monitoring well." Based on recorded groundwater elevations, it was determined that groundwater flow on the property was to the northwest. Based on this direction of groundwater flow, on 7 December 1990, a deep overburden well (MW-5D) was installed adjacent to (and south of) MW-5 to a depth of 33 ft [8, pp. 6-7].

On 29 October 1990, a program of quarterly groundwater monitoring and water quality sampling was implemented. Based on a review of the former contents of the UST, P&W proposed that only the hazardous components of the materials formerly contained in the UST required analysis. Consequently, only dissolved silver and pH were identified and approved for quarterly groundwater sample analysis [8, p. 12]. Quarterly monitoring and sampling were conducted on the following dates: 29 October 1990, 24 January, 29 April, and 29 July 1991; however, MW-5D was not included in the 29 October 1990 sampling event since it wasn't installed until December 1990. In addition to the analysis of dissolved silver and pH as required by the Closure Plan, samples were analyzed for nitrate and turbidity during the third round of water quality sampling [8, pp. 11-12].

According to F&O, "analytical results compiled over four quarters of water quality sampling have revealed no detectable concentrations of dissolved silver at the site." Furthermore, "concentrations [of dissolved silver] have consistently been below the IPDWS of 0.050 ppm" [8, p. 15].

Groundwater pH measured over four sampling quarters was consistently within the range of 6.5 to 8.5 as recommended by CTDOH. During the third round of groundwater monitoring at the site, nitrate concentrations ranged from 3.7 ppm to 8.2 ppm, which are below the IPDWS for this parameter. Turbidity values observed across the property during the third quarter exceeded the recommended CTDOH Standard of 5 NTUs. F&O indicated that "the most likely explanation for these high background turbidity levels is the presence of a large silt fraction in the overburden formation" [8, pp. 15-16].

On 16 April 1993, F&O collected additional groundwater samples from the monitoring wells on the property to comply with a 5 March 1993 CTDEP request for additional information. Each of the six on-site wells were sampled and analyzed for the following parameters: dissolved aluminum, dissolved potassium, dissolved sodium, turbidity, chloride, nitrate, phosphate, sulphate, ammonia, TPHs, and phthalates by EPA Method 8270. The analytical results indicated the presence of aluminum, potassium, sodium, nitrate, and sulphate; however, only nitrate (8.4 ppm in MW-5) was detected at a concentration greater than three times the background concentration (2.5 ppm in MW-2) [15].

On 6 September 2000, START personnel collected four groundwater samples (GW-02 through GW-05), including a duplicate, from three temporary well points installed on the property (the monitoring wells had since been decommissioned). The groundwater samples were analyzed through EPA CLP for VOCs, SVOCs, pesticides, PCBs, TAL metals, and cyanide. Groundwater sample GW-05 was used as a reference sample since it was collected from a location crossgradient and away from potential on-site sources [17, pp. 16-18]. Table 7 summarizes the groundwater samples collected by START on 6 September 2000.

Table 7

**Sample Summary: Heyman Properties/Pratt & Whitney
Groundwater Samples Collected by START on 6 September 2000**

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Source
MATRIX: Aqueous				
GW-02	ARB07 MANE74	1315	Grab	Collected from TWP-2. pH = 8.2, T = 20.9°C, Conductivity = 395 µS, FID = 0 ppm.
GW-03	ARB08 MANE75	1315	Grab	Duplicate of GW-02 for quality control.
GW-04 (MS/MSD)	ARB09 MANC75	1530	Grab	Collected from TWP-4. pH = 7.78, T = 14.3°C, Conductivity = 312.9 µS, FID = 0 ppm.
GW-05	ARB10 MANC76	1810	Grab	Collected from TWP-5, as a reference sample. pH = 7.85, T = 16.8°C, Conductivity = 311.6 µS, FID = 0 ppm.

MS/MSD = Matrix Spike/Matrix Spike Duplicate
T = Temperature
FID = Flame Ionization Detector
ppm = Parts per million

hrs = Hours
°C = Degrees Celsius
µS = Micro Siemens

[17, pp. 16-18]

Complete analytical results of START groundwater samples, including quantitation and detection limits, are presented in Attachment B. Sample results qualified with a "J" on analytical tables are considered approximate because of limitations identified during CLP data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

Table 8 is a summary of organic compounds and inorganic elements detected through CLP analyses of START groundwater samples. For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration (GW-05). However, if the compound or element is not detected in the reference sample, the reference sample's SQL (for organic analyses) or SDL (for inorganic analyses) is used as the reference value. These compounds or elements are listed if they occurred at a value equal to or greater than the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values.

Table 8
Summary of Analytical Results
Groundwater Sample Analysis for Heyman Properties/Pratt & Whitney

Sample Location	Compound/Element	Sample Concentration	Reference Concentration	Comments
GW-02	INORGANICS			
	Sodium	22,200 ppb	8,710 U ppb	2.55 × SDL
GW-03	INORGANICS			
	Cadmium	3.0 J ppb	2.3 U ppb	1.3 × SDL
	Sodium	22,800 ppb	8,710 U ppb	2.62 × SDL
GW-04	INORGANICS			
	Sodium	40,000 ppb	8,710 U ppb	4.6 × SDL

J = Quantitation is approximate due to limitations identified during the quality control review.
U = Indicates the substance was analyzed for but not detected. The associated numerical value is the SDL.
ppb = Parts per billion.
SDL = Sample Detection Limit.

[52-53]

No VOCs, SVOCs, pesticides, PCBs, or cyanide were detected in the groundwater samples at concentrations greater than three times the reference sample concentration or greater than or equal to the reference sample's SQL or SDL [52-53].

Two metals, cadmium and sodium, were detected in the groundwater samples at concentrations greater than three times the reference sample concentration or greater than or equal to the reference sample's SDL. Cadmium was detected in GW-03 at 3.0 J ppb. Sodium was detected in GW-02, GW-03, and GW-04 at 22,200 ppb, 22,800 ppb, and 40,000 ppb, respectively [53]. Sodium has only been detected in groundwater samples collected from the property. Cadmium has historically been

detected in soil and concrete samples collected from the property; however, it was only detected in one groundwater sample at a concentration 1.3 times the reference sample's SDL, and it was not detected in the corresponding duplicate sample [2; 12; 15]. As a result, the presence of cadmium and sodium in START groundwater samples will not be considered attributable to the HP/P&W property.

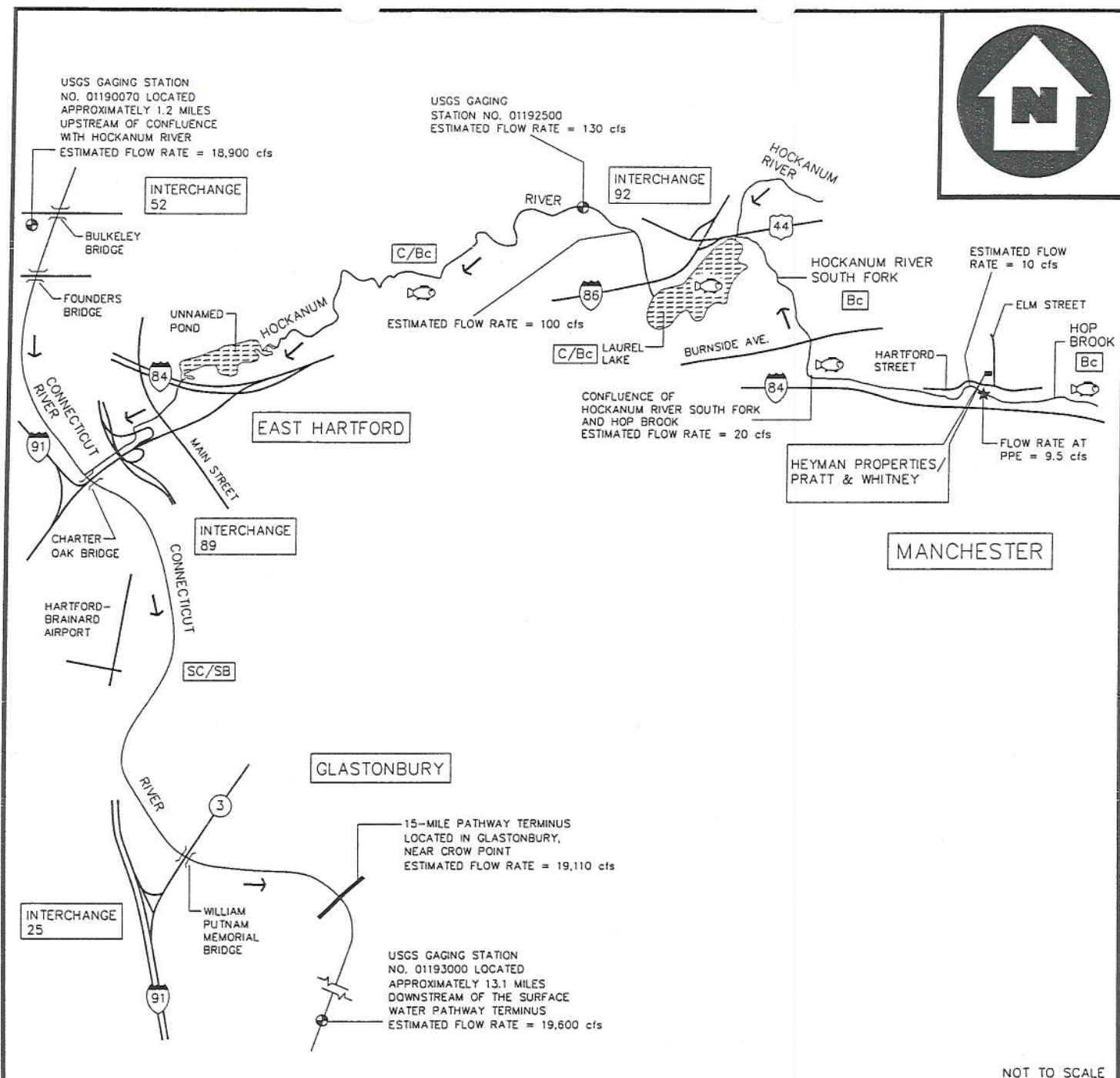
START collected groundwater samples as part of the HP/P&W SI. Based on the analytical results, a release to groundwater from on-site sources has not been documented. As a result, no impacts to nearby groundwater targets are known or suspected.

SURFACE WATER PATHWAY

The HP/P&W property is located within the South Fork Hockanum River sub-drainage basin of the Hockanum Regional Complex located within the Connecticut River Major Drainage Basin [8, p. 3]. Stormwater runoff on the property flows into on-site catchbasins and catchbasins located on Pine Street and Hall Court. The catchbasins discharge to Hop Brook, located 0.1 miles south of the property, via a 4-ft diameter concrete culvert [17, p. 15; 38]. The probable point of entry (PPE) to surface water is located along Hop Brook at the culvert. From the PPE, Hop Brook flows west for approximately 1.8 miles to the Hockanum River, South Fork. The surface water pathway continues to flow west-northwest for approximately 1 mile and discharges into the Hockanum River. Flow continues west along the Hockanum River for 0.1 mile where it enters Laurel Lake, flows for 0.6 miles, then re-enters the Hockanum River for 7.2 miles prior to discharging into the Connecticut River 10.7 miles downstream of the PPE. The 15-mile downstream terminus occurs along the Connecticut River at a point approximately 1.2 miles downstream of Route 3 in Glastonbury, CT (Figure 4) [30-35; 42].

The drainage basin area of Hop Brook measured at the PPE is approximately 5.25 square miles (mi^2). Using the U.S. Geological Survey (USGS) conversion factor of 1.8 cubic feet per second (cfs)/ mi^2 , Hop Brook has an estimated flow rate of 9.5 cfs at the PPE. The drainage basin area of Hop Brook measured at its confluence with the Hockanum River, South Fork is approximately 11 mi^2 . Using the USGS conversion factor of 1.8 cfs/ mi^2 , Hop Brook has an estimated flow rate of 20 cfs at its confluence with the Hockanum River, South Fork. Using interpolation, Hop Brook has a flow rate of 10 cfs at a point approximately 0.1 mile downstream of the PPE [42].

The drainage basin area of the Hockanum River measured at a USGS gaging station (No. 01192500) located approximately 4.5 miles downstream of the PPE is 73.4 mi^2 . Using the USGS conversion factor of 1.8 cfs/ mi^2 , the Hockanum River has an estimated flow rate of 130 cfs at the gaging station. Using interpolation, the Hockanum River has a flow rate of 100 cfs at a point approximately 3.7 miles downstream of the PPE [39; 42]. The drainage basin area of the Connecticut River measured at a USGS gaging station (No. 01190070) located approximately 1.2 miles upstream of its confluence with the Hockanum River is 10,487 mi^2 . Using the USGS conversion factor of 1.8 cfs/ mi^2 , the Connecticut River has an estimated flow rate of 18,900 cfs at the gaging station. The drainage basin area of the Connecticut River measured at a USGS gaging station (No. 01193000) located approximately 13.1 miles downstream of the 15-mile downstream surface water pathway terminus is 10,887 mi^2 . Using the USGS conversion factor of 1.8 cfs/ mi^2 , the Connecticut River has an estimated flow rate of 19,600 cfs at the gaging station. Using interpolation, the Connecticut River has a flow rate of approximately 19,110 cfs at the 15-mile downstream surface water pathway terminus [40-42]. Table 9 summarizes the surface water bodies along the 15-mile downstream pathway from the property.



NOT TO SCALE

SURFACE WATER PATHWAY SKETCH

HEYMAN PROPERTIES/PRATT & WHITNEY
15 HALL COURT
MANCHESTER, CONNECTICUT

Table 9

**Surface Water Bodies Along the 15-Mile Downstream Pathway from
Heyman Properties/Pratt & Whitney**

Surface Water Body	Descriptor ^a	Length of Reach (miles)	Flow Characteristics (cfs) ^b	Length of Wetland Frontage (miles)
Hop Brook (Reach 1)	Minimal stream	0.1	< 10	0.0
Hop Brook (Reach 2)	Small to moderate stream	1.7	10 to 20	0.0
Hockanum River, South Fork	Small to moderate stream	1.0	20 to <100	0.3
Hockanum River (Reach 1)	Small to moderate stream	0.1	> 20 to < 100	0.2
Laurel Lake	Small to moderate stream	0.6	> 20 to <100	0.5
Hockanum River (Reach 1)	Small to moderate stream	0.2	> 20 to 100	0.0
Hockanum River (Reach 2)	Moderate to large stream	7.0	> 100 to < 1,000	1.0
Connecticut River	Large river	4.3	>18,900 to 19,110	2.5

^a Minimal stream <10 cfs. Small to moderate stream 10-100 cfs. Moderate to large stream >100-1,000 cfs. Large river >10,000-100,000 cfs.

^b Cubic feet per second.

[24-35; 39-42]

Hop Brook and the Hockanum River, South Fork are classified by CTDEP as Class Bc waterways, which are water bodies known or presumed to meet water quality criteria which support designated uses such as recreational use, fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses including navigation. In addition, these water bodies are cold water fisheries. The Hockanum River and Laurel Lake are classified as Class C/Bc waterways, which are water bodies presently not meeting water quality criteria or one or more designated uses due to pollution. The portion of the Connecticut River along the 15-mile downstream pathway is classified as a Class SC/SB water body, which is a water body presently not meeting Class SB water quality criteria or one or more designated uses [43]. Approximately 4.5 miles of wetland frontage occur along the 15-mile downstream pathway [42]. Information regarding State- and Federally-endangered/threatened species habitats along the 15-mile downstream pathway and within 4-radial miles of the property could not be obtained from State or Federal sources. Table 10 summarizes the sensitive environments located along the 15-mile downstream pathway from the property.

Table 10**Sensitive Environments Along the 15-Mile Downstream Pathway from
Heyman Properties/Pratt & Whitney**

Sensitive Environment Name	Sensitive Environment Type	Surface Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs) ^a
Hop Brook	Clean Water Act-protected water body	Hop Brook	0	< 10
Hockanum River, South Fork Wetlands	Wetlands (0.3 miles)	Hockanum River, South Fork	1.8 to 2.8	20 to <100
Hockanum River Wetlands	Wetlands (0.2 miles)	Hockanum River (Reach 1)	2.8 to 2.9	> 20 to < 100
Laurel Lake Wetlands	Wetlands (0.5 miles)	Laurel Lake	2.9 to 3.5	> 20 to < 100
Hockanum River Wetlands	Wetlands (1.0 mile)	Hockanum River (Reach 2)	3.7 to 10.7	>100 to <1,000
Connecticut River Wetlands	Wetlands (2.5 miles)	Connecticut River	10.7 to 15	>18,900 to 19,110

^a Cubic feet per second

PPE = Probable Point of Entry

[24-30; 39-42]

On 6 September 2000, START personnel collected five sediment samples (SD-01 through SD-05), including a duplicate, from four locations along Hop Brook to determine if there has been a release of hazardous substances to Hop Brook from on-site sources. Samples SD-04 and SD-05 were collected as upstream reference samples for Hop Brook. The sediment samples were submitted to a DAS laboratory for analysis for VOCs, SVOCs, pesticides, PCBs, TAL metals, and cyanide, with the exception of SD-05 which was analyzed for TAL metals only [17, pp. 16-18]. Table 11 summarizes the sediment samples collected by START on 6 September 2000.

Table 11

**Sample Summary: Heyman Properties/Pratt & Whitney
Sediment Samples Collected by START on 6 September 2000**

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Feet)	Sample Source
MATRIX: Sediment					
SD-01	D02372	0900	Grab	0 to 0.5	Collected from Hop Brook, approximately 50 ft downstream of the culvert. Wet, brown, coarse-to-fine SAND with pebbles. pH = 7.95, T = 11.6°C, Conductivity = 217.6 μ S, FID = 0 ppm.
SD-02	D02373	0900	Grab	0 to 0.5	Duplicate of SD-01 for quality control.
SD-03 (MS/MSD)	D02374	0925	Grab	0 to 0.5	Collected from Hop Brook, at the culvert. Wet, light gray, coarse-to-fine SAND with pebbles. pH = 8.04, T = 12.7°C, Conductivity = 221.8 μ S, FID = 0 ppm.
SD-04	D02375	0955	Grab	0 to 0.5	Collected from Hop Brook, approximately 100 ft upstream of the culvert, as a reference sample. Wet, light gray-to-brown, coarse-to-fine SAND with pebbles. pH = 7.98, T = 11.7°C, Conductivity = 210.7 μ S, FID = 0 ppm.
SD-05	D02376	1000	Grab	0 to 0.5	Collected from Hop Brook, approximately 105 ft upstream of the culvert, as a reference sample (analyzed for metals only). Wet, light gray-to-brown, coarse-to-fine SAND with pebbles. pH = 7.98, T = 11.7°C, Conductivity = 210.7 μ S, FID = 0 ppm.

MS/MSD = Matrix Spike/Matrix Spike Duplicate
 hrs = Hours
 ft = Feet
 T = Temperature
 °C = Degrees Celsius
 μ S = Micro Siemens
 FID = Flame Ionization Detector
 ppm = Parts per million

[17, pp. 16-18]

Complete analytical results of START sediment samples, including quantitation and detection limits, are presented in Attachment C. Sample results qualified with a "J" on analytical tables are considered approximate because of limitations identified during DAS data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

Table 12 is a summary of organic compounds and inorganic elements detected through DAS analyses of START sediment samples. For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration (SD-04 or SD-05). However, if the compound or element is not detected in the reference sample, the reference sample's SQL (for organic analyses) or SDL (for inorganic analyses) is used as the reference value. These compounds or elements are listed if they occurred at a value equal to or greater than the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values.

Table 12
Summary of Analytical Results
Sediment Sample Analysis for Heyman Properties/Pratt & Whitney

Sample Location	Compound/Element	Sample Concentration	Reference Concentration	Comments
SD-01	VOCs			
	Butanone, 2-	34 J ppb	10 UJ ppb	3.4 × SQL
	Ethylbenzene	11 J ppb	10 UJ ppb	1.1 × SQL
	Toluene	4 J ppb	1 J ppb	4 × Ref
	Xylene (Total)	53 ppb	10 UJ ppb	5.3 × SQL
SD-02	VOCs			
	Butanone, 2-	20 J ppb	10 UJ ppb	2.0 × SQL
	Ethylbenzene	14 ppb	10 UJ ppb	1.4 × SQL
	Hexanone, 2-	41 J ppb	10 UJ ppb	4.1 × SQL
	Toluene	4 J ppb	1 J ppb	4 × Ref
	Xylene (Total)	68 ppb	10 UJ ppb	6.8 × SQL
	SVOCs			
	Acenaphthylene	270 J ppb	58 J ppb	4.7 × Ref
	Anthracene	290 J ppb	46 J ppb	6.3 × Ref
	Benzo(a)anthracene	810 J ppb	220 J ppb	3.7 × Ref
	Benzo(a)pyrene	650 ppb	200 J ppb	3.3 × Ref
	Benzo(k)fluoranthene	420 ppb	130 J ppb	3.2 × Ref
	Chrysene	880 J ppb	260 J ppb	3.4 × Ref
	Fluoranthene	1,500 J ppb	490 ppb	3.1 × Ref
	Phenanthrene	1,000 J ppb	270 J ppb	3.7 × Ref
	Pyrene	1,600 J ppb	470 ppb	3.4 × Ref

Table 12

Summary of Analytical Results
Sediment Sample Analysis for Heyman Properties/Pratt & Whitney (Concluded)

Sample Location	Compound/Element	Sample Concentration	Reference Concentration	Comments
SD-03	VOCs			
	Xylene (Total)	36 ppb	10 UJ ppb	3.6 × SQL
	SVOCs			
	Acenaphthylene	320 J ppb	58 J ppb	5.5 × Ref
	Anthracene	350 J ppb	46 J ppb	7.6 × Ref
	Benzo(a)anthracene	1,300 ppb	220 J ppb	5.9 × Ref
	Benzo(a)pyrene	1,100 ppb	200 J ppb	5.5 × Ref
	Benzo(b)fluoranthene	1,400 ppb	250 J ppb	5.6 × Ref
	Benzo(g,h,i)perylene	860 ppb	150 J ppb	5.7 × Ref
	Benzo(k)fluoranthene	760 ppb	130 J ppb	5.8 × Ref
	Carbazole	280 J ppb	33 J ppb	8.5 × Ref
	Chrysene	1,500 ppb	260 J ppb	5.8 × Ref
	Dibenzo(a,h)anthracene	290 J ppb	62 J ppb	4.7 × Ref
	Fluoranthene	2,900 ppb	490 ppb	5.9 × Ref
	Indeno(1,2,3-cd)pyrene	730 ppb	130 J ppb	5.6 × Ref
	Phenanthrene	1,800 ppb	270 J ppb	6.7 × Ref
	Pyrene	2,500 ppb	470 ppb	5.3 × Ref

Ref = Reference value

J = Quantitation is approximate due to limitations identified during the quality control review.

UJ = Indicates the substance was analyzed for but not detected. The associated numerical value is the estimated SQL.

ppb = Parts per billion

VOCs = Volatile Organic Compounds

SVOCs = Semivolatile Organic Compounds

SQL = Sample Quantitation Limit

[50-51]

Five VOCs were detected in the sediment samples at concentrations greater than three times the reference sample (SD-04) concentration or greater than or equal to the reference sample's SQL. The highest concentrations of these VOCs included the following: 2-butanone (34 J ppb in SD-01), ethylbenzene (14 ppb in SD-02), 2-hexanone (41 J ppb in SD-02), toluene (4 J ppb in SD-01 and SD-

02), and total xylenes (68 ppb in SD-02) [50]. These VOCs are not known to have been used on the property. Ethylbenzene, toluene, and xylenes were present in START soil/source samples; however, their concentrations in soil were not greater than three times the reference sample concentration [50]. In addition, ethylbenzene, toluene, and xylenes are common constituents of petroleum products, and several petroleum spills have been documented in the vicinity of the property [54, Attachment B]. As a result, the presence of the VOCs in START sediment samples will not be considered attributable to the HP/P&W property.

Fourteen SVOCs were detected in the sediment samples (specifically SD-02 and SD-03) at concentrations greater than three times the reference sample (SD-04) concentration or greater than or equal to the reference sample's SQL. Substance concentrations noted with a "J" indicate approximate results due to limitations identified during the quality control review. The highest concentrations of these SVOCs were detected in SD-03, and included the following: acenaphthylene (320 J ppb); phenanthrene (1,800 ppb); anthracene (350 J ppb); carbazole (280 J ppb); fluoranthene (2,900 ppb); pyrene (2,500 ppb); benzo(a)anthracene (1,300 ppb); chrysene (1,500 ppb); benzo(b)fluoranthene (1,400 ppb); benzo(k)fluoranthene (760 ppb); benzo(a)pyrene (1,100 ppb); indeno(1,2,3-cd)pyrene (730 ppb); dibenzo(a,h)anthracene (290 J ppb); and benzo(g,h,i) perylene (860 ppb) [50]. SVOCs are not known to have been used on the property, and samples collected from the property were historically not analyzed for SVOCs. None of these SVOCs were detected in START soil/source samples collected from the HP/P&W property [52]. In addition, much of the surrounding area is paved and sample locations SD-02 and SD-03 were located in Hop Brook at the stormwater outfall pipe. Stormwater from paved areas and roadways typically contains numerous SVOCs. As a result, the presence of the SVOCs in START sediment samples will not be considered attributable to the HP/P&W property.

No pesticides, PCBs, metals, or cyanide were detected in the sediment samples at concentrations greater than three times the reference sample concentration or greater than or equal to the reference sample's SQL or SDL [50-51].

START collected sediment samples as part of the HP/P&W SI. Based on the analytical results, a release from on-site sources to nearby surface water has not been documented. As a result, no impacts to sensitive environments located downstream of the property are known or suspected.

SOIL EXPOSURE PATHWAY

There are currently no full-time employees who work on the property. Access to the property is unrestricted. The nearest residence is located approximately 100 ft north of the property (Velvet Mills Apartment complex). There are no schools or day-care facilities located within 200 ft of the property; however, the St. James School is located approximately 2,000 ft northeast of the property. No terrestrial sensitive environments were noted on the property [17]. There are an estimated 1,263 people residing within 0.25-radial miles of the property, and an estimated 14,748 people residing within 1-radial mile of the property [36].

On 8 January 1987, approximately 100 gallons of No. 4 fuel oil were spilled while P&W was having the fuel oil UST filled from a delivery tanker truck. The No. 4 fuel oil spill was contained with Speedi-Dri™ and sand. All contaminated soil was excavated on 9 January 1987, and disposed off site at an approved facility [14, pp. 3-4].

On 20 July 1988, following removal of the 10,000-gallon UST, four soil samples (A through D) were collected by F&O from the excavation, beneath the asphalt pavement. In addition, two soil samples (E and F) were collected from beneath the asphalt pavement, just below the vertical runs of the two underground pipe lines associated with the UST, namely a 3-inch fill pipe and a 1.5-inch vent pipe. Furthermore, four background soil samples (G, H, I, and J) were collected. Sample G was collected from the front of the property, south of the building, and beneath the asphalt pavement; sample H was collected from the north lawn at the rear of the building; no information was available regarding the locations of samples I and J. All of the samples were collected from a depth of 6 to 12 inches bgs, and were submitted for laboratory analysis for total metals by EPA Method 7000 series, and for cyanide by EPA Method 9010 [2, p. 20].

According to F&O, the analytical results indicated that “arsenic and lead soil concentrations are both greater than their health-based criteria [of 0.022 ppm and 24 ppm, respectively];” however, F&O further indicated that “the concentrations [of arsenic and lead] observed are consistent with the natural conditions of the area soil.” Arsenic was present in samples A through F at 2.9 ppm, 3.1 ppm, 5 ppm, 4 ppm, 1 ppm, and 2.9 ppm, respectively. Lead was present in samples C, D, and F at 48 ppm, 35 ppm, and 77 ppm, respectively. Additionally, iron (23,000 ppm in E) and zinc (350 ppm in F) were detected in the soil samples collected from beneath the pipe lines at concentrations which exceeded three times the average background concentration. Two of the background soil samples (I and J) contained elevated concentrations of arsenic (15 ppm and 12 ppm), copper (45 ppm and 20 ppm), lead (130 ppm and 210 ppm), mercury (0.49 ppm and 0.75 ppm), nickel (42 ppm and 18 ppm), silver (1.9 ppm and 1.6 ppm), and zinc (50 ppm and 100 ppm) relative to the concentration of these elements in background samples G and H [2, p. 22, Table 8].

Between 20 and 25 September 1990, five soil borings were advanced by F&O south of the building on the property and completed as shallow, overburden groundwater monitoring wells (MW-1 through MW-5). During the advancement of soil borings MW-1, MW-4, and MW-5, soil samples were collected at the surface and then at 5-ft intervals to the base of the boring; continuous soil samples were collected in MW-2 and MW-3. All of the soil samples were screened on site for VOCs with an OVA; none of the samples exhibited detectable concentrations of VOCs. As a result, none of the soil samples were submitted for laboratory analysis; however, a composite soil sample of the soil cuttings from all of the soil borings was submitted for laboratory analysis for VOCs by EPA Methods 8010 and 8020 and for RCRA-8 metals by TCLP [8, pp. 7-8]. The analytical results of the composite soil sample indicated that barium was detected above detection limits at 0.711 ppm; however, this concentration was below the TCLP regulatory level of 100 ppm. As a result, the soil cuttings were not “characteristically hazardous.” However, for ease of disposal, the cuttings were “removed from the site by a Connecticut-licensed hauler and transported to a licensed hazardous waste disposal facility along with soil and concrete produced as a result of closure activities” [8, p. 8].

START did not collect surface soil samples as part of the HP/P&W SI; however, subsurface soil samples were collected at locations coinciding with the proposed groundwater samples. Based on available data, impacts to on-site soils from former on-site sources are unknown; however, based on site observations such as the lack of public use of the property, and the fact that nearly the entire property is covered by the building and/or asphalt paving, no impacts to nearby residential populations are known or suspected.

AIR PATHWAY

There are currently no full-time employees who work on the property. Access to the property is unrestricted. The nearest residence is located approximately 100 ft north of the property (Velvet Mills Apartment complex). There are no schools or day-care facilities located within 200 ft of the property; however, the St. James School is located approximately 2,000 ft northeast of the property [17]. There are an estimated 82,447 people residing within 4-radial miles of the property [36]. Table 13 summarizes the estimated population within 4-radial miles of the property.

Table 13

**Estimated Population Within 4-Radial Miles of
Heyman Properties/Pratt & Whitney**

Radial Distance from Heyman Properties/Pratt & Whitney (miles)	Estimated Population
On a Source	0
> 0.00 to 0.25	1,263
> 0.25 to 0.50	1,773
> 0.50 to 1.00	11,712
> 1.00 to 2.00	21,997
> 2.00 to 3.00	17,316
> 3.00 to 4.00	28,386
TOTAL	82,447

[17; 36]

An estimated 646 acres of wetlands exist within 4-radial miles of the property [24-29; 42]. Information regarding State- and Federally-endangered/threatened species habitats along the 15-mile downstream pathway and within 4-radial miles of the property could not be obtained from State or Federal sources. Table 14 summarizes the sensitive environments located within 4-radial miles of the property.

Table 14

**Sensitive Environments Located Within 4-Radial Miles of
Heyman Properties/Pratt & Whitney**

Radial Distance from Heyman Properties/Pratt & Whitney (miles)	Sensitive Environments/Species (status)
On a Source	None
≥ 0.00 to 0.25	Clean Water Act-protected water body
> 0.25 to 0.50	None
> 0.50 to 1.00	Wetlands (12 acres)
> 1.00 to 2.00	Wetlands (30 acres)
> 2.00 to 3.00	Wetlands (277 acres)
> 3.00 to 4.00	Wetlands (327 acres)

[24-30; 42]

On 12 October 1999, START personnel conducted an on-site reconnaissance on the property. Ambient air was monitored using an FID. A sump containing standing liquid, believed to be water, was observed in the southwest corner of the building. According to Mr. Montany, the sump may have once been associated with a non-contact cooling water system, and is believed to have housed a pump which transferred cooling water from the sump back to equipment via overhead piping. The interior of the sump was not visible. The FID recorded a reading of 50 units above background when inserted into the opening of the sump. No other readings above background were recorded during the reconnaissance [17, p. 10]. It is unknown which of the three sumps was the sump observed by START personnel since Sump Nos. 1 and 2 were allegedly filled with concrete and Sump No. 3 was allegedly removed.

START did not collect air samples as part of the HP/P&W SI. No quantitative air samples have been collected from the property to date. Moreover, based on site observations such as the existence of an impervious cover, no impacts to nearby residential populations or sensitive environments are known or suspected.

SUMMARY

The Heyman Properties/Pratt & Whitney (HP/P&W) property is located at 15 Hall Court in Manchester, Hartford County, Connecticut. The HP/P&W property comprises approximately 2.25 acres and is identified on Manchester Tax Assessor Map No. 13. According to the Manchester Tax Assessor, the property does not have a Lot No. The property is owned by Heyman Properties of Westport, Connecticut.

The HP/P&W property is bordered to the north by the Velvet Mills Apartment complex; to the east by Elm Street and the Clocktower Place Apartment complex; to the west by Pine Street and the Yarn Mill Apartment complex; and to the south by Hall Court and a theater. The property is occupied by a brick, single-story warehouse building (commonly known as the Manchester Foundry) with a footprint of approximately 200 feet (ft) by 300 ft. On the south side of the building is a paved parking lot which encompasses the area south of the building to the edge of Hall Court. Stormwater runoff from the southern parking lot is directed toward a catchbasin located southwest of the property, at the corner of Hall Court and Pine Street. A chain-link fence partially surrounds the property, and numerous broken windows at ground level provide relatively easy access to the building's interior. The property is served by municipal water and sewage.

While in operation from 1956 to 1988, Pratt & Whitney (P&W) manufactured airfoils for jet engines. Operations formerly conducted by P&W included metal fabricating, cleaning, degreasing, "Anodic Etch Line", "Fluorescent Penetrant Inspection", boring, grinding, sanding, deburring, wheel cutting, shell making, wet grit blasting, water jet cut-off, and X-ray casting and inspection. Wastes generated by these processes were stored in two areas of the property: a former waste container storage area (WCSA), and a former 10,000-gallon underground storage tank (UST). In addition, a No. 4 fuel-oil UST was located north of the building; however, the volume of the UST could not be obtained from available file information.

From 1988 through 1993, several environmental investigations were conducted on the property, specifically, the installation of monitoring wells and soil and groundwater sampling. The analytical results of soil, concrete, and groundwater samples collected from the property collectively have indicated the presence of volatile organic compounds (VOCs) and metals. As part of closure activities for the facility, all equipment within the building had been removed from the property by 1993.

On 6 September 2000, Roy F. Weston, Inc. (WESTON®) Superfund Technical Assessment and Response Team 2000 (START) personnel collected five sediment samples from locations along Hop Brook, and five soil/source samples and four groundwater samples from the property. Five VOCs and 14 semivolatile organic compounds (SVOCs) were detected in the sediment samples; one VOC, one SVOC, and two metals were detected in the soil/source samples; and two metals were detected in the groundwater samples above background concentrations.

Groundwater beneath the property occurs at approximately 17 to 23 ft below ground surface (bgs). Based on groundwater elevation data collected by Fuss & O'Neill, Inc. (F&O), groundwater flow is toward the northwest. An estimated 29,853 people are served by private groundwater sources within 4-radial miles of the HP/P&W property.

Stormwater runoff on the property flows into on-site catchbasins and catchbasins located on Pine Street and Hall Court. The catchbasins discharge to Hop Brook, located 0.1 miles south of the property, via a 4-ft diameter concrete culvert. The probable point of entry (PPE) to surface water is located along Hop Brook at the culvert. From the PPE, Hop Brook flows west for approximately 1.8 miles to the Hockanum River, South Fork. The surface water pathway continues to flow west-northwest for approximately 1 mile and discharges into the Hockanum River. Flow continues west along the Hockanum River for 0.1 mile where it enters Laurel Lake, flows for 0.6 miles, then re-enters the Hockanum River for 7.2 miles prior to discharging into the Connecticut River 10.7 miles downstream of the PPE. The 15-mile downstream terminus occurs along the Connecticut River at a point approximately 1.2 miles downstream of Route 3 in Glastonbury, Connecticut.

There are currently no full-time employees who work on the property. Access to the property is unrestricted. The nearest residence is located approximately 100 ft north of the property (Velvet Mills Apartment complex). There are no schools or day-care facilities located within 200 ft of the property; however, the St. James School is located approximately 2,000 ft northeast of the property. No terrestrial sensitive environments were noted on the property. There are an estimated 14,748 people residing within 1-radial mile of the property, and an estimated 82,447 people within 4-radial miles of the property.

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